

## **5.5 ALTERNATIVES**

To formulate alternatives the planning team first developed a list of potential measures that could be taken to help achieve project goals and objectives. Upon further consideration of project constraints, several were eliminated. The remainder was then combined in various ways to form an initial list of preliminary alternatives. As preliminary alternatives were evaluated some were eliminated, while others were retained. Those retained formed the final array of alternatives and were evaluated and compared in a variety of detailed analyses.

### **5.5.1 Future without Project Condition (No-Action Alternative)**

Under this alternative, the construction of bridges or other appurtenances to facilitate the passage of water from the L-29 Canal under the Tamiami Trail to NESRS would not take

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place. The road would remain in its existing configuration. Although this alternative fails to meet the planning goals, objectives, and requirements, its evaluation is required by Section 1502.14 of the Council on Environmental Quality regulations implementing the National Environmental Policy Act of 1970.

### 5.5.2 Minimal Measures to Protect Tamiami Trail

In the early plan formulation process, minimal measures for modifications to Tamiami Trail were investigated. Armoring of Tamiami Trail with geotechnical fabric and riprap was considered as a possible means of protecting the road once the increased flows of 4,000 cfs were established. There are two major drawbacks to armoring Tamiami Trail: 1) the cost would be approximately \$46,000,000, and the sub-base of the road would continue to be saturated; and 2) problems with pumping, rutting, and overtopping of the road would remain unsolved.

Another minimal measure idea was the installation of sheet pile walls. There are two major drawbacks to the installation of sheet piling along Tamiami Trail: 1) the high estimated cost (\$73,663,600), and 2) the inability to provide sheet flow to the park. Because these of their high costs and significant deficiencies in achieving goals and objectives, these two plans were not developed in the preliminary alternative array.

### 5.5.3 Preliminary Array of Alternatives

The Corps, agency representatives, and the public during public scoping workshops developed a list of 13 potential alternatives and posted these alternatives along with the advantages and disadvantages of each on the Jacksonville District web site (Appendix D). This array of alternatives was developed by a Corps multidisciplinary team, which provided expertise in the area of hydraulics/hydrology, geotechnical engineering, planning procedures, and project management/project implementation. The information was used as an initial step in the planning process and as a basis for additional refinement of alternatives. The following describes the outcome of this initial investigation and development of the original 13 alternatives.

- **No-Action.** Under this alternative, the roadway would not be modified. Although this alternative would not meet the requirements or objectives of the project, it was retained for further evaluation to satisfy the requirements of NEPA.
- **New Tamiami Trail Alignment North of Existing Road.** This alternative involves the relocation of the roadway to the north of the L-29 Canal on the northern side of the L-29 Levee. The subgrade of the relocated roadway would be constructed at a higher elevation. *This alternative was retained for further evaluation as Alternative 3 in subsequent sections of this report.*
- **New Tamiami Trail Alignment South of Existing Road.** Under this alternative, the roadway would be relocated to a location immediately to the south of the existing roadway. The subgrade of the roadway would be constructed at a higher elevation. *This alternative was retained for further evaluation as Alternative 4 in subsequent sections of this report.*

- **Raising Low Portions of Tamiami Trail.** This alternative was not retained for further evaluation because of complications associated with the rerouting of traffic and the continued potential for subgrade inundation associated with high water stages and the backwater effect in the canal.
- **Incorporation of Bridge Spans on Current Tamiami Trail Alignment.** This alternative involves the construction of bridges along the existing roadway. *This alternative was retained for further evaluation as Alternative 1 in subsequent sections of this report.*
- **Placement of Underground Distribution Pipe South of Tamiami Trail.** This alternative was not retained for further evaluation because the discharge would not be distributed evenly to NESRS, the potential for disturbance to ENP lands during construction, encroachment on ENP land due to the limited right-of-way, the potential for subgrade inundation, potential impacts to wood stork rookeries, and the loss of wetland habitat.
- **Placement of Additional Culverts in Tamiami Trail.** This preliminary alternative was initially eliminated from further evaluation because of complications from rerouting traffic around construction zones and the potential for subgrade inundation. After further analysis, however, this alternative was developed as Alternative 8.
- **Raising Entire 11-Mile Length of Tamiami Trail.** Under this alternative, the highway would be elevated along the entire length of the project area. *This alternative was retained for further consideration as Alternative 5 in subsequent sections of this report.*
- **Clearing of Exotic Vegetation South of Tamiami Trail.** This alternative involves the removal of vegetation to the south of existing culverts to reduce the water flow. An examination of the culverts by FDOT (Appendix E) concluded that vegetation was not restricting flows and that "...the primary determining factor for flow rate through the culverts is the water level. Rapid flow rates coincide with dredged waterways south of the culverts and restricted flow rates are associated with shallow water wetlands..." ENP prefers not to allow removal of vegetation or land disturbance; temporary impacts to the ENP ecosystem could result from mobilization of machinery for vegetation removal and from possible water-borne transport of exotic seed sources due to clearing activities. This alternative was not retained for further evaluation.
- **Move Westbound Lane of Tamiami Trail to L-29 Levee.** Under this alternative, the roadway would be reconstructed on top of the L-29 Levee. This alternative was not retained for further evaluation because of the high cost, the impacts to businesses south of the road, the fact that L-29 Levee is not designed for use as a roadway, the incompatibility with the CERP alternative of removing the L-29 Levee, the complications of placing a roadway on S-355 Structures, and the impacts to the Tigertail Camp.

- **Combination of Bridge Spans and Raising Portions of Tamiami Trail.** This alternative involves the construction of bridges along the existing roadway and the raising of portions of the roadway that would have the greatest potential for flooding. *This alternative was retained for further evaluation as Alternative 2 in subsequent sections of this report.*
- **Combination of Bridge Spans and Clearing of Exotic Vegetation South of Tamiami Trail.** This alternative is similar to the previous alternative, but it also includes the removal of vegetation that has a potential to interfere with of water flow through culverts. This alternative was not retained for further consideration because of complications due to rerouting of traffic around construction zones and because of ENP preferences not to allow removal of vegetation or land disturbances. Additionally, the remaining vegetation could continue to hinder flows to NESRS, temporary impacts to the ENP ecosystem could occur due to mobilization of machinery used for vegetation removal, and waterborne transport of exotic seed sources may result from clearing activities.
- **Combination of Bridge Spans, Raising Portions of Tamiami Trail, Placement of Additional Culverts, and Clearing of Exotic Vegetation.** This alternative is similar to the previous alternative, except that it includes the installation of additional culverts under the road. It was not retained for evaluation for the same reason as the previous alternative (combination of bridge spans and clearing of exotic vegetation south of Tamiami Trail).

### 5.5.4 CERP (Yellow Book) Alternative: Ten-Bridge Plan

The CERP report originally discussed the concept of providing 10 bridges across the Tamiami Trail as a way to decompartmentalize WCA-3B and NESRS. This conceptual plan included ten 100-foot-long bridges evenly spaced along the alignment as a means to distribute the flow evenly. Conceptual costs of bridge construction alone, with little or no engineering design performed, were estimated to be \$11.1 million. Initial estimates for a four-bridge plan, based on limited engineering analysis, show that the cost would be approximately \$14.4 million. However, as discussed below, when all the other factors affecting the cost of each of the bridge plans are included, the 10 bridge plan was more expensive.

In addition to the bridge construction costs, other factors evaluated by the planning design team included roadway costs, spatial distribution of the flow, and maintenance of traffic (MOT) during construction. The roadway costs and the spatial distribution of flow were very similar for both the four-bridge and 10-bridge plans, while the MOT for the 10-bridge plan would be more complicated and, ultimately, more expensive. Based on this evaluation, the planning design team decided not to develop the 10-bridge plan. The four-bridge plan was subsequently incorporated into alternatives 1, 2, and 4.

### 5.5.5 Screening of Preliminary Alternatives

The initial set of 13 preliminary alternatives developed by the Corps, participating agencies, and the public was screened by a multi-disciplinary study team comprised of Corps personnel. As stated in Section 5.5.2, several of the alternatives were eliminated from further development. Others received additional consideration based on the

advantages and disadvantages presented in Appendix D, as well as on refined hydraulic modeling. Six of the preliminary alternatives, including the no-action plan described in Section 5.6.1, were retained for further evaluation. It was expected that continued public and interagency input would result in one or more additional preliminary alternatives requiring further development. Three additional alternatives were identified during this process.

### **5.5.6 Final Alternative Array**

Nine alternatives were selected, for detailed engineering evaluation and comparative analysis. Descriptions and costs of the final array of alternatives presented in this section were excerpted from detailed Engineering Analyses that were performed

**5.5.6.1 No- Action Alternative.** Under the No-Action Alternative, none of the proposed measures to prevent degradation of the roadway would be constructed. MWD flows of 4,000 cfs would be conveyed from the L-29 Canal to ENP by the existing culvert system under the Tamiami Trail. The inclusion of this alternative in an environmental impact statement is required by 40 CFR 1502.14.

**5.5.6.2 Alternative 1. Existing Alignment and Profile with Four New Bridges.** This alternative includes four bridges and components of the existing Tamiami Trail to be reassembled as transitions to the new bridges (Figure 7). The existing section consists of two 12-foot-wide travel lanes, a 10-foot-wide shoulder on the north side, and a 10-foot-wide shoulder on the south side. With this alternative, the Tamiami Trail would have a grade transition from the nominal average 11-foot elevation to roughly 17 feet at the bridge deck. A large segment of the Tamiami Trail would remain intact.

New bridges would be built on the existing alignment, with traffic temporarily detoured to the south while bridge construction is in progress. Two of the bridges would be aligned with S-355A and S-355B, and the other two would be situated approximately midway between these structures and the east and west ends of the project, respectively. The two middle bridges would have a hydraulic width of 300 feet each, while the two outer bridges would have a hydraulic width of 425 feet each. The optimum span length for the superstructure system of the permanent bridges would be around 30 feet. The substructure system for the bridges would embody 18-inch square piles. The 43'-1" wide bridge typical section for the four bridges within this alternative provides sufficient deck area for two 12-foot-wide travel lanes and 8-foot-wide shoulders on both sides of the travel lanes.

Because this alternative does not include reconstruction of the existing highway, no option for water quality treatment is included. However, best management practices (BMPs) suitable for erosion and sedimentation controls would be provided during construction.

Existing utilities within the existing roadway corridor near the bridges may be affected by the construction. Staging areas for construction equipment and materials would be located near the eastern end of the corridor and at the locations of businesses along the highway. Staging and other functions would possibly require the utilization of sections of the existing shoulder for temporary periods.

The construction cost for Alternative 1 is estimated to be \$14,330,871, and the total life cycle cost is estimated to be \$21,189,677.

**5.5.6.3 Alternative 2a. Existing Roadway Alignment with Raised Profile and Four New Bridges without Water Quality Treatment.** Alternative 2 would involve the modification of the existing Tamiami Trail alignment, profile, and typical section, throughout the length of the study segment and would include the construction of four new bridges to convey MWD project flows from the L-29 Canal to ENP (Figure 8). The typical section consists of two 12-foot-wide travel lanes and 8-foot-wide shoulders on each side of the roadway. Five feet of this shoulder would be paved.

The construction of the bridges would be accomplished as described for Alternative 1. Two of the bridges would be aligned with S-355A and B, and the other two would be located approximately midway between these structures and the east and west ends of the project, respectively. The two middle bridges would have a hydraulic width of 300 feet each, while the two outer bridges would have a hydraulic width of 425 feet each. The 43'-1" wide bridge typical section for the four bridges within this alternative would provide sufficient deck area for two 12-foot-wide travel lanes, and 8-foot shoulders on both sides of the travel lanes.

Alternative 2 has been divided into two sub-alternatives (2a and 2b) to consider the treatment of highway runoff to improve water quality.

Alternative 2a would upgrade the existing roadway to accommodate a design high water elevation of 9.3 feet and traffic for 50 years. The existing asphalt pavement would be left intact to serve as a construction platform and a black base. Low areas along the highway would be raised to a minimum elevation of 11.0 feet throughout the project. A 6-inch asphalt overlay would also be included. A 7-year resurfacing interval for this option would appear warranted.

Traffic would be maintained as it exists today. A moving operation would complete the overlay of the existing roadway would be accomplished using a moving operation. Staging areas for construction equipment and materials could be located on business parcels to be acquired along the corridor or inactive now. Otherwise, staging and other functions might utilize sections of the existing shoulder for temporary periods. A staging area may be needed near the east end of the corridor, with materials moved a remaining short distance on an as needed basis.

Construction cost for Alternative 2a is estimated to be \$24,354,651, and the total life cycle cost is estimated to be \$32,530,077.

**5.5.6.4 Alternative 2b. Existing Roadway Alignment with Raised Profile and Four New Bridges with Water Quality Treatment.** Alternative 2b (Figure 9) would require widening the embankment footprint to provide water quality treatment facilities on each side of the roadway. With this option, the top of the pavement would be at an elevation of 14 feet. The bottom of the limerock base would be at an elevation of 12.75 feet, providing roughly 3.5 feet of clearance above the design high water elevation of 9.3 feet. As a precaution against capillary rise from the water table, a 4-inch granular drainage layer would be placed beneath the LBR 40 subbase. A 12-year resurfacing interval would be recommended.

Water quality treatment would be achieved with dry linear retention facilities adjacent to the roadway that collect highway runoff during rainfall events. The invert elevations would be set one foot above the new high control elevation of the L-29 Canal. Based on water quality treatment criteria established by FDEP, the depth of the treatment area is estimated at 0.5 feet deep. All utilities within the typical section would require relocation.

Under Alternative 2b, temporary barricades would be spaced every 50 feet at the north edge of the westbound travel lane. In one-quarter mile increments, the existing guardrail would be removed and replaced with a temporary barrier wall. The existing shoulder would be removed and replaced with temporary pavement. Once completed for the entire project length, traffic would be shifted to the north, utilizing the new pavement. A 10-foot-wide strip of temporary pavement placed south of the existing centerline would allow the roadway to slope to the north at 2 percent. A temporary concrete barrier would be placed one foot north of the south edge of the temporary pavement. Staging areas for construction equipment and materials could be located at the businesses along the corridor. Other staging areas may be necessary near the east end of the corridor.

Alternative 2b would require an additional 51 feet of right-of-way to accommodate the water treatment facilities on either side of the road and the slopes for the higher reconstructed highway.

The construction cost for Alternative 2b is estimated to be \$58,550,658 and the total life cycle cost is estimated to be \$50,126,440.

**5.5.6.5 Alternative 3a. New Roadway to the North with Eight New Bridges without Water Quality Treatment.** Alternative 3 involves the construction of a new roadway with eight bridges immediately north of the L-29 Levee on the north side of the Tamiami Trail (Figure 10). This alternative has been divided into two sub-alternatives (3a and 3b) to consider water quality treatment of highway runoff. This alternative would enable flows to be conveyed from WCA-3B across the L-29 Levee to the L-29 Canal. The typical section consists of two 12-foot-wide travel lanes, and 8-foot-wide shoulders on each side of the roadway. Five feet of the shoulder would be paved. Alternative 3 would provide for a 15-foot-wide canal maintenance berm.

The eight bridges would be located:

- Over the L-29 Canal at the western end of the project.
- Over the L-29 Canal at the eastern end of the project.
- At the S-355A drainage structure
- At the S-355B drainage structure
- At the site of the Airboat Association of Florida
- At the Weir A location
- At the Weir B location
- At the Weir C location

The bridges would be aligned with existing S-355A and B (each with flow channel bottom widths of 60 feet), and with weirs A, B, and C, would be 200 feet, 150 feet, and 200 feet long, respectively. Bridges over the L-29 Canal near each end of the corridor would connect with the existing highway. A bridge over the canal would provide access to the site of the Airboat Association of Florida.

The 43-foot, 1-inch-wide bridge typical section applies to all eight bridges to provide sufficient deck area for two 12-foot-wide travel lanes and 8-foot shoulders on both sides of the travel lanes. A 35-foot, 1-inch-wide bridge typical section would apply to the access bridge to the Airboat Association of Florida site and would provide sufficient deck area for two 12-foot-wide travel lanes and 4-foot shoulders on both sides of the travel lanes.

The roadway elevation would be 17.4 feet to conform to the elevation of the future Pump Station 356 tieback levee. A nominal 4-foot pavement envelope would be required, providing ample clearance above the 9.3-foot design high water elevation. A periodic resurfacing interval of 12 years would be recommended. Utility relocations would be necessary.

Because this alternative does not retain the centerline of the existing facility, alignment transitions would be required at either end of the project limits. Existing traffic flow would be maintained. Once a temporary transition roadway is completed, traffic would then be shifted while permanent transitions to the new roadway are constructed. Following construction of the new roadway, traffic would be shifted to the new alignment, and the existing roadway would be removed. Staging areas for construction equipment and materials would be located on the sites of the businesses along the corridor. Staging and other functions may require use of the existing shoulder for temporary periods.

Access to the Flight 592 Memorial and the S-333 structure would be retained. The alignment would be shifted to the north to minimize impacts to the Tigertail Camp, S-355A, and S-355B. A portion of the existing roadway would be retained at the western end of the project area to provide access to the Osceola Camp.

The existing Tamiami Trail embankment would be breached at locations near those of the bridge locations for alternatives 1 and 2. This would allow conveyance of flows south into ENP.

The construction cost for Alternative 3a is estimated to be \$67,959,310 and the total life cycle cost is estimated to be \$70,751,666.

**5.5.6.6 Alternative 3b. New Roadway to the North with Eight New Bridges with Water Quality Treatment.** Alternative 3b would have a slightly wider footprint than Alternative 3a because of the incorporation of water quality treatment (Figure 11), which would be achieved with dry linear retention facilities adjacent to the roadway. The treatment facilities would have a control elevation of 9.5 feet and an overall depth of one foot.

The construction cost for Alternative 3b is estimated to be \$73,457,368, and the total life cycle cost is estimated to be \$76,249,766.

**5.5.6.7 Alternative 4a. New Roadway to the South with Four New Bridges without Water Quality Treatment.** Alternative 4 consists of a new road constructed immediately to the south of the Tamiami Trail within the edge of ENP (Figure 12). This alternative has been divided into two sub-alternatives (4a and 4b) enabling consideration of water quality treatment of highway runoff.

Two bridges of Alternative 4a would be aligned with S-355A and B (each with flow-channel bottom widths of 60 feet), and the other two would be located approximately midway between these structures at the eastern and western ends of the project, respectively. The two middle bridges would have a hydraulic width of 300 feet each, while the two outer bridges would have a hydraulic width of 425 feet each. The existing roadway embankment would be breached at locations approximating the bridge locations for alternatives 1 and 2.

The 43-foot, 1-inch-wide bridge typical section for the four bridges within this alternative provides sufficient deck area for two 12-foot-wide travel lanes and 8-foot-shoulders on both sides of the travel lanes.

Because Alternative 4a does not retain the centerline of the existing facility, alignment transitions would be required at either end of the segment. At the eastern end of the corridor, the S-356 pump station, the S-334 spillway replacement, and adjustments to levees and the Tamiami Trail would affect the transition. The typical section consists of two 12-foot-wide travel lanes, and 8-foot-wide shoulders on each side of the roadway. Five feet of this shoulder would be paved.

Temporary barricades would be placed every 50 feet at the southern edge of the westbound travel lane. In one-quarter mile increments, the existing guardrail would be removed and replaced with temporary barrier walls. The existing shoulder would be removed and replaced with temporary pavement. Once completed for the entire project length, traffic would be shifted to the north, utilizing the new pavement. A 10-foot wide strip of temporary pavement would be placed south of the existing centerline to allow the roadway to slope to the north at two percent. A temporary concrete barrier would be placed one foot north of the south edge of the temporary pavement.

Staging areas for construction equipment and materials may be located at the business sites along the corridor. Staging and other functions may also require use of the existing shoulder for temporary periods, as well as locations near the eastern end of the corridor.

It would be necessary to obtain right-of-way from the Airboat Association of Florida to construct the roadway under this alignment.

The construction cost for Alternative 4a is estimated to be \$45,235,110, and the total life cycle cost is estimated to be \$48,233,140.

**5.5.6.8 Alternative 4b. Build New Roadway to the South with Four New Bridges with Water Quality Treatment.** Alternative 4b would have a wider footprint than Alternative 4a because of the incorporation of water quality treatment, consisting of dry linear retention facilities adjacent to the roadway (Figure 13). The treatment elevation would be 9.5 feet. The treatment facilities would have an overall depth of one foot. Due to the proximity of the new alignment to the existing roadway, the treatment facilities on the north side of the new alignment would have to be constructed in the existing embankment.

The construction cost for Alternative 4b is estimated to be \$47,128,438, and the total life cycle cost is estimated to be \$50,126,440.

**5.5.6.9 Alternative 5a. Elevated Roadway within Existing Right-of-Way without Water Quality Treatment.** Alternative 5 involves the construction of an elevated roadway generally within the right-of-way of the existing Tamiami Trail (Figure 14). Alternative 5 has been divided into two sub-alternatives (5a and 5b) for evaluation of water quality treatment measures, and one sub-alternative 5c to evaluate removal of the existing highway embankment.

Alternative 5a consists of a bridge that covers the entire 10.7-mile length of the MWD project area. At each end, there would be short reconstruction segments of the roadway to transition to the new bridges. The pavement would have a grade transition from the nominal average of an 11-foot elevation to about 22.5 feet at the bridge deck.

The 43-foot, 1-inch-wide bridge typical section would provide sufficient deck area for two 12-foot wide travel lanes and 8-foot shoulders on both sides of the travel lanes. Exceptions would occur where a surface connection for access or other reasons might be required. A 35-foot, 1-inch-wide bridge typical section would provide access to the Airboat Association of Florida and include sufficient deck area for two 12-foot-wide travel lanes, and 4-foot-wide shoulders on each side of the travel lanes. The new bridge deck would be equipped with drain scuppers that discharge directly to the area below.

The existing Tamiami Trail embankment would be breached at locations similar to the bridge locations for alternatives 1 and 2.

This alignment would be positioned to minimize impact and construction cost and to facilitate maintenance of traffic during construction. The alternative would require only a modest alignment transition at either end of the segment.

Temporary barricades would be placed every 50 feet at the southern edge of the westbound travel lane. In ¼-mile increments the existing guardrail would be removed and replaced with temporary barrier wall. The existing shoulder would be removed and replaced with temporary pavement. Once completed for the entire project length, traffic would be shifted to the south, utilizing the new pavement. A 10-foot-wide strip of temporary pavement would be placed north of the existing centerline to allow the roadway to slope to the north at 2 percent. A temporary concrete barrier would be placed one foot north of the southern edge of the temporary pavement. The bridge would then be constructed.

Staging areas for construction equipment and materials may be located at business sites along the corridor. Staging and other functions may also require use of the existing shoulder for temporary periods. Staging areas may be necessary near the eastern end of the corridor.

Connecting roads would provide temporary access to the Airboat Association of Florida. A connecting road from the west would provide temporary access to the Osceola Camp. In addition, turning lanes may be needed at these locations.

Existing utilities would be affected by the new construction.

The construction cost for Alternative 5a is estimated to be \$135,915,000, and the total life cycle cost is estimated to be \$135,994,180.

**5.5.6.10 Alternative 5b. Elevated Roadway within Existing Right-of- Way with Water Quality Treatment.** Alternative 5b includes the same alignment as described in Alternative 5a, but also incorporates water quality treatment. Piping would convey highway runoff to dry retention swales constructed on adjacent segments of the abandoned roadway embankment. Swales would be approximately 600 feet long and spaced at one-half mile intervals; there would be approximately 22 in the corridor. Workers using lightweight equipment transported by boat would provide maintenance of swales. Culverts under the existing roadway embankment would be unaffected by new construction except for breaches for water flow and would be left in place.

The construction cost for Alternative 5b is estimated to be \$140,314,000, and the total life cycle cost is estimated to be \$140,393,480.

**5.5.6.11 Alternative 5c. Elevated Roadway within Existing Right-of- Way, without Water Quality Treatment, with Degradation of the Existing Highway Embankment.** This alternative is identical to Alternative 5a except that it would incorporate the removal of the existing highway and the highway embankment beneath the elevated structure.

The construction cost for Alternative 5c is estimated to be \$142,156,700, and the total life cycle cost is estimated to be \$142,235,880.

**5.5.6.12 Alternative 6a. Existing Alignment with Raised Profile, Four-Mile Bridge without Water Quality Treatment.** Alternative 6 incorporates features of Alternatives 2 and 5. It would raise the profile of the existing Tamiami Trail and constructing a four-mile bridge (Figure 15). This alternative has been divided into two sub-alternatives (6a and 6b) for evaluation of water quality treatment measures.

In Alternative 6a, the existing Tamiami Trail embankment profile and typical section would be modified for approximately three miles at the western end of the project and approximately four miles at the eastern end. The centerline would fall close to the existing centerline of the highway. The existing asphalt pavement would be left in place to serve as a base. Low areas would be leveled to a minimum elevation of 11.0 feet, and a 6-inch asphalt overlay would be added.

Approximately four miles of the roadway would be reconstructed as an elevated structure. The bridge typical section would be standard throughout the entire length, with two travel lanes of 12 feet, two shoulders of eight feet, and outside barriers. The low member elevation would be at an elevation of 13.5 feet. The bridge would begin at the Blue Shanty Canal, approximately three miles from the western end of the project and extend to just east of the Cooperstown Canal. The bridge would be equipped with drain scuppers that would discharge directly to the area below. The existing Tamiami Trail embankment would be breached at four evenly spaced locations along the four-mile bridge totaling approximately 1,500 feet. Access would be provided to the Airboat Association of Florida site by means of a 35'-1" wide bridge with two 12-foot travel lanes and four-foot shoulders.

This alignment would be positioned to minimize impacts and construction costs and to facilitate maintenance of traffic during construction. No significant alignment transitions would be required at either end of the segment.

The construction cost for Alternative 6a included 8 box culverts and, is estimated to be \$72,877,979. The total life cycle cost is estimated to be \$77,994,054.

**5.5.6.13 Alternative 6b. Existing Alignment with Raised Profile, Four-Mile Bridge and Eight New Box Culverts with Water Quality Treatment.** This alternative (Figure 16) would shift the centerline of the roadway approximately 27 feet to the south to provide water quality treatment facilities on each side of the road. The existing roadway embankment would be removed down to the bedrock, and a new embankment would be constructed. With this option, the top of the pavement would be at an elevation of 14 feet. The bottom of the limerock base would be at an elevation of 12.75 feet, providing roughly 3.5 feet of clearance above the design high water elevation of 9.3 feet. As a precaution against capillary rise from the water table, a 4-inch granular drainage layer would be placed beneath the LBR 40 subbase. A 12-year resurfacing interval would be recommended.

Dry linear retention facilities, constructed on adjacent segments of the existing roadway embankment, would be used to collect highway runoff during rainfall events, providing water quality treatment. The invert elevations would be set one foot above the new high control elevation of the L-29 Canal. Based on water quality treatment criteria established by FDEP, the depth of the treatment area is estimated at 0.5 feet deep. All utilities within the typical section would require relocation. The bridge would be equipped with piping to convey the runoff to dry retention facilities. Approximately seven such swales, approximately 600 feet long would be spaced at 0.5-mile intervals along the bridge.

Workers using lightweight equipment transported by boat would provide maintenance. For constructing the bridge portion, the existing roadway would be shifted to the south to prevent traffic flow underneath the structure. Construction staging would be done from a barge in the L-29 Canal. For roadway construction, traffic would be shifted to the north on a temporary pavement.

The right-of-way would extend 51 feet farther to the south than the existing one. Box culverts could be installed as described for Alternative 6a.

The construction cost for Alternative 6b is estimated to be \$81,369,677, and the total life cycle cost is estimated to be \$83,245,822.

**5.5.6.14 Alternative 7a. Existing Alignment with Raised Profile and 3,000-foot Bridge without Water Quality Treatment.** Alternative 7 combines features of Alternatives 5 and 2. It would modify the existing Tamiami Trail profile and typical section at the beginning and end of the project area, and construct an approximately 3,000-foot bridge (Figure 17). The bridge would be sited between Blue Shanty and Coopertown. This alternative is divided into two sub-alternatives (7a and 7b) for consideration of water quality treatment of highway runoff.

Under Alternative 7a, the existing Tamiami Trail embankment profile and typical section would be modified for approximately one mile at the western end of the project and approximately 9.4 miles at the eastern end. The centerline would fall very close to the existing centerline. The existing asphalt pavement would be left in place to serve as a base. Low areas would be leveled to a minimum elevation of 11.0 feet, and a 6-inch asphalt overlay would be added.

Approximately 3,000 feet of the roadway would be reconstructed as an elevated structure. The bridge typical section would be standard throughout the entire length, with two travel lanes of 12 feet, two shoulders of eight feet, and outside barriers. The low member elevation would be at an elevation of 13.5 feet. The bridge would be equipped with drain scuppers that would discharge directly to the area below. The existing Tamiami Trail embankment would be removed adjacent to the bridge. Access would be provided to the Airboat Association of Florida site by means of a 35'-1" wide bridge with two 12-foot travel lanes and four-foot shoulders.

This alignment would be positioned to minimize impacts and construction costs and to facilitate maintenance of traffic during construction. No significant alignment transitions would be required at either end of the segment.

The construction cost for Alternative 7a is estimated to be \$23,045,733, and the total life cycle cost is estimated to be \$31,003,830.

**5.5.6.15 Alternative 7b. Existing Alignment with Raised Profile and 3,000-foot Bridge with Water Quality Treatment.** This alternative (Figure 18) would shift the centerline of the roadway approximately 27 feet to the south to provide for water quality treatment facilities on each side of the road. The existing roadway embankment would be removed down to the bedrock, and a new embankment would be constructed. With this option, the top of the pavement would be at an elevation of 14 feet. The bottom of the limerock base would be at an elevation of 12.75 feet, providing roughly 3.5 feet of clearance above the design high water elevation of 9.3 feet. As a precaution against capillary rise from the water table, a 4-inch granular drainage layer would be placed beneath the LBR 40 subbase. A 12-year resurfacing interval would be recommended.

Approximately 3,000 feet of the roadway would be reconstructed as an elevated structure. The bridge typical section would be standard throughout the entire length, with two travel lanes of 12 feet, two shoulders of eight feet, and outside barriers. The low member elevation would be at an elevation of 13.5 feet. The bridge would be equipped with drain scuppers that would discharge directly to the area below. The existing Tamiami Trail embankment would be removed adjacent to the bridge. Access would be provided to the Airboat Association of Florida site by means of a 35'-1" wide bridge with two 12-foot travel lanes and four-foot shoulders.

Dry linear retention facilities adjacent to the roadway would collect highway runoff during rainfall events and provide water quality treatment. The invert elevations would be set one foot above the new high control elevation of the L-29 Canal. Based on water quality treatment criteria established by FDEP, the depth of the treatment area is estimated at 0.5 feet deep. All utilities within the typical section would require relocation. The bridge would be equipped with piping to convey the runoff to dry retention facilities at either end of the bridge.

For roadway construction of Alternative 7b, temporary barricades would be spaced every 50 feet at the north edge of the westbound travel lane. In one-quarter mile increments, the existing guardrail would be removed and replaced with a temporary barrier wall. The existing shoulder would be removed and replaced with temporary pavement. Once completed for the entire project length, traffic would be shifted to the north, utilizing the

new pavement. A 10-foot-wide strip of temporary pavement placed south of the existing centerline would allow the roadway to slope to the north at 2 percent. A temporary concrete barrier would be placed one foot north of the south edge of the temporary pavement.

For construction of the 3,000-foot bridge, the existing roadway would be shifted to the south to prevent traffic flow underneath the structure. Construction staging would be done from a barge in the L-29 Canal.

The right-of-way would extend 51 feet farther to the south than the existing right-of-way.

The construction cost for Alternative 7b is estimated to be \$51,858,385, and the total life cycle cost is estimated to be \$54,776,745.

**5.5.6.16 Alternative 8a. Existing Alignment with Raised Profile and Additional Culverts without Water Quality Treatment.** Alternative 8 would modify the existing roadway profile and typical section throughout the length of the project and construct new box culverts to convey flows from the L-29 Canal to ENP. The box culverts would be 5 feet high and 10 feet wide (inside dimensions) with an invert elevation of 3.0 feet. They would be installed throughout the roadway alignment. Two sub-alternatives, 8a and 8b, consider with and without treatment facilities for highway runoff.

In Alternative 8a, the existing embankment and culverts would be left in place, and 24 box culverts would be installed to supplement the existing 57 culverts. The centerline would fall very close to the centerline of the existing highway, and little or no additional right-of-way would be required. The existing asphalt pavement would be left in place as a construction platform, and it would serve as a base for construction. The low areas of the roadway would be leveled to a minimum of 11.0 feet throughout the project. A 6-inch overlay would be placed on top.

This alignment would be positioned to minimize impacts and construction costs and to facilitate maintenance of traffic during construction. There are no significant alignment transitions required at either end of the segment.

The box culverts would consist of precast sections, with invert elevations of 3 feet. Because the elevation of the existing bedrock is nominally at 3 feet, shallow excavation of the bedrock would be required. Air hammers mounted to large track hoes would be used for excavation; blasting is not permissible. A sand-cement mixture would be used as a foundation for the box culverts. The existing roadway would be retained; the embankment would be excavated and the box culverts set.

Existing traffic flow would be maintained. A moving operation would complete the overlay of the existing roadway. Staging areas could be located at existing businesses, augmented by using sections of the existing shoulder and the eastern end of the corridor.

The construction cost for Alternative 8a is estimated to be \$45,499,995, and the total life cycle cost is estimated to be \$53,892,652.

**5.5.6.17 Alternative 8b. Existing Alignment with Raised Profile and Additional Culverts with Water Quality Treatment.** This alternative (Figure 19) would shift the

centerline of the roadway approximately 35 feet to the south to provide for water quality treatment facilities on each side of the road. The existing roadway embankment would be removed down to the bedrock, and a new embankment would be constructed. With this option, the top of the pavement would be at an elevation of 14 feet. The bottom of the limerock base would be at an elevation of 12.75 feet, providing roughly 3.5 feet of clearance above the design high water elevation of 9.3 feet. As a precaution against capillary rise from the water table, a 4-inch granular drainage layer would be placed beneath the LBR 40 subbase. A 12-year resurfacing interval would be recommended. This alternative involves the installation of 40 culverts, rather than the 24 culverts in Alternative 8a, because the existing 57 culverts would be lost.

Dry linear retention facilities adjacent to the roadway would collect highway runoff during rainfall events and provide water quality treatment. The invert elevations would be set one foot above the new high control elevation of the L-29 Canal. Based on FDEP water quality treatment criteria, the depth of the treatment area is estimated at 0.5 feet deep. All utilities within the typical section would require relocation.

For constructing the roadway portion of Alternative 8b, temporary barricades would be spaced every 50 feet at the north edge of the westbound travel lane. In one-quarter mile increments, the existing guardrail would be removed and replaced with a temporary barrier wall. The existing shoulder would be removed and replaced with temporary pavement. Once completed for the entire project length, traffic would be shifted to the north, utilizing the new pavement. A temporary concrete barrier would be placed one foot north of the south edge of the temporary pavement.

The right-of-way would extend 57 feet farther to the south than the existing right-of-way.

The construction cost for Alternative 8b is estimated to be \$47,081,029, and the total life cycle cost is estimated to be \$50,587,749.

**5.5.6.18 Bridge Alignment Alternatives.** Bridge construction would be performed in one of three ways.

- **Bridge Option 1.** New bridges would be built to the south of the existing road. Analysis showed this option to be the most cost-effective. Two reverse curves in the alignment at every bridge would be introduced.
- **Bridge Option 2.** New bridges would be built on the existing alignment with a temporary detour to the south around the immediate area of construction. This option is less cost-effective than option 1; however, it would reduce the amount of permanent wetland impacts. Alignment curvatures and permanent wetland disruption would be avoided.
- **Bridge Option 3.** New bridges would be built on the existing alignment with temporary detour to the north (in the L-29 Canal). This option would avoid temporary impact to wetlands south of the road, but would require a costly detour on structural elements located north of the existing road. This option would constitute over \$52 million of the total project cost.

For the purposes of comparison of alternatives and life-cycle costs Bridge Option 2 was analyzed with each of the alternatives.

#### **5.5.6.19 Additional Water Quality Treatment Alternatives**

Alternatives 2b, 3b, 4b, 6b, 7b, and 8b incorporate dry retention systems on both sides of the roadway for the treatment of highway runoff, whereas Alternative 5b incorporates the placement of dry retention on the remaining embankment. This type of system is relatively simple to build and maintain. However, in consideration of the wide footprint required for dry retention and the impacts to ENP wetlands, additional water quality treatment options were identified and evaluated.

**Option 1: Shifting and/or Compressing the Roadway Section.** This option would shift, the typical section and of Alternative 2b to the north. Encroachment into the L-29 Canal would be accommodated by widening the canal to the north, or by using vertical wall sections in two different configurations to reduce the width of the typical section in the area of the dry retention swales.

**Option 1-A: Shift Alignment and Compress Swale with Wall Elements/South Side.** The typical section and the dry retention area would be compressed between a reinforced wall and a short gravity wall on the southern side of the roadway to reduce encroachment into ENP wetlands. It would not encroach into the L-29 Canal (Figure 20).

The construction of a reinforced wall along the south side of the existing roadway would serve to minimize the extent of this encroachment, and the dry retention area is compressed between the reinforced wall and a short gravity wall.

The existing pavement, sub-grade, fill, and muck would be removed totally and back-filled with appropriate fill to the bottom of the sub-grade. A double wall section on the south side would provide a 5-foot-wide dry retention area. The placement of this walled section on the south side provides adequate space on the north side for a 5-foot-wide dry retention area with standard reinforced side slopes. Runoff from the south side of roadway would enter the south side swale through barrier wall inlets, whereas runoff from the north side would sheet flow into the north side retention area. The bottom elevation of the swales would be 9.5 feet.

Construction of this alternative would require that traffic lanes be shifted to the south and a temporary wall system installed adjacent to the roadway on the south side. The remaining existing embankment on the south side would then be removed and the new embankment installed up to the elevation of the existing road. The temporary wall system would be extended upward to permit the completion of the new roadway. Traffic would be shifted to the new roadway, and the northern portion of the roadway would be excavated and reconstructed up to finish profile. The new roadway section would then be completed and traffic shifted to the final configuration.

The additional profile elevation affects the section width, which would be 29 feet less than Alternative 2b. This option does not encroach into the hydraulic capacity of the L-29 Canal. The estimated cost for this alternative is \$132,214,250 for the length of the corridor. This is a \$73,663,592 additive to the cost of Alternative 2b.

**Option 1-B: Shift Alignment and Compress Swale with Wall Elements/North Side.**

The typical section would be compressed by installing a wall system that would encroach into the L-29 Canal but not the wetlands of ENP on the south side of the roadway (Figure 21). Construction of a reinforced wall along the north side of the existing roadway entails the placement of piles and concrete panels in the L-29 Canal at an elevation near the bottom of the canal.

The existing pavement, sub-grade, fill, and muck would be removed and back-filled with appropriate fill to the bottom of the sub-grade. A double wall section on the north side would provide a 5-foot-wide dry retention area. The placement of this walled section on the north side would provide adequate space on the south side to provide a 5-foot-wide dry retention area with standard reinforced side slopes. Runoff from the north side of roadway would enter the north side swale through barrier wall inlets, whereas runoff from the south side would sheet flow into the south side retention area. The bottom of the swales would be the same as for Alternative 2b - With Water Quality Treatment (Dry Retention Swales), which is at elevation 9.5 feet, with a depth of one foot.

Constructing this alternative would require that traffic lanes be shifted to the south and a temporary wall system installed adjacent to the roadway on the south side. Then the remaining existing embankment on the south side would be removed and the new embankment installed up to the elevation of the existing road. The temporary wall system would be extended upward to permit the completion of a portion of the new roadway. Traffic would be shifted to the new roadway and the north portion of the roadway excavated and reconstructed up to finish profile. The new roadway section would then be completed and traffic shifted to the final configuration. There is a cost premium associated with this scheme because of roadway elevation differentials and the need for a temporary wall.

This option would encroach into the L-29 Canal, removing about 200 square feet of flow area. The loss could be compensated for by removal of an equal area along the northern bank of the canal or by deepening the canal. The estimated cost for this alternative is \$160,484,850 for the length of the corridor. This is a \$101,934,192 additive to the cost of Alternative 2b.

**Option 1-C: Shift Typical Section North into L-29 Canal.** In this option, the typical section would be shifted northward, encroaching approximately 50 feet into the L-29 Canal (Figure 22). The southern bank of the canal would be filled in, and the northern bank of the canal would require excavation.

While this is conceptually feasible, there are several associated issues. First, because the canal is approximately 100 feet wide, the 50 feet of encroachment and resulting excavation would consume most of the maintenance road to the north of the canal. It may be possible to excavate the lower portion of this replacement widening at a steeper slope to replace the lost hydraulic capacity. This would allow for a relocated canal maintenance road and would permit the telephone and fiber optic utilities to remain in place.

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Second, the method for filling in the canal to achieve sufficient load capacity and fill stability may require use of the construction method noted for Option 1-B, wherein a concrete panel wall is constructed to contain the fill material. This approach would reduce the lost cross-sectional area in the canal and require less excavation to the north, but, it would significantly increase the cost of the solution.

Other issues associated with this concept are preserving the required canal section near the Tigertail Camp, at the recreational area at structures S-355A and S-355B, and at the site of the four weir structures. In these areas, several solutions could be considered. The roadway section could be shifted to the south to avoid impacts, but shifting to the south would encroach into ENP.

In addition, such offsets could result in an unacceptably “wavy” alignment with safety implications. It appears that if the extent of canal excavation is reduced from 50 feet to 25-30 feet, then the existing and future water control structures would not be affected.

Placing the roadway on structure in these areas over the canal would add significant costs, considering the lengths involved.

If impacts to water control structures are avoidable, then a compromise would be to shift the alignment at the Tigertail Camp and the eastern recreational area and incur some wetlands impact. A total distance of about 3,500 feet of the roadway would encroach into the wetlands in each of these areas, with the extent of the encroachment ranging up to 59 acres for Alternative 2b. This would yield a wetland impact of 2.7 acres per location or a total of 5.4 acres.

Construction of this alternative would require that traffic lanes be shifted to the south within the existing roadway and a temporary wall system installed adjacent to the roadway on the north side. The remaining existing embankment on the north side would then be removed and the new embankment installed in this area and in the canal up to the elevation of the existing road.

The existing pavement, sub-grade, fill, and muck would be removed and backfilled with appropriate fill to the bottom of the sub-grade. This step would be preceded by the placement of the wall system in the canal, if necessary. The temporary wall system would be extended upward to allow the completion of a portion of the new roadway. Traffic would be shifted to the new roadway and the south portion of the roadway excavated and reconstructed up to finish profile. The new roadway section would then be completed and traffic shifted to the final configuration. Such a phasing scheme carries a cost premium because of the roadway elevation differentials and the need for the temporary wall. This option also encroaches into the hydraulic capacity of the L-29 Canal, removing about 900 square feet of flow area.

For the option in which canal fill is not contained by a wall, and a like area is excavated from the north bank, the estimated cost for this alternative is \$73,917,450 for the length of the corridor. This would be a \$15,366,792 addition to the cost of Alternative 2b, assuming the water control structures would not be affected and the alignment would be shifted at the other two locations. This cost estimate does not include relocation of utilities on the levee or a wall system for retaining fill on the south bank of the canal.

**Option 2: Exfiltration Trenches with Curb and Gutter.** An exfiltration trench would be installed below the roadway, with roadway runoff routed from a curb and gutter section with inlets spaced every 200 feet (Figure 23). The exfiltration trench would be an 18-inch perforated pipe surrounded by coarse aggregate extending the length of the corridor, less the bridge sections, on both sides of the roadway.

The collected runoff in the pipe to infiltrate into the surrounding aggregate and dissipate into the adjacent fill material. An envelope of filter fabric would prevent introduction of sand into the rock trench. The invert of the exfiltration trench pipe would need to be above the design high water elevation of the L-29 Canal, or elevation 9.3 feet. The roadway profile would need to be approximately two feet higher than that of Alternative 2b, or a centerline elevation of 16.0 feet.

The additional profile elevation affects the section width, but requires 17 to 27 feet less width (without and with stabilized side slopes respectively) than Alternative 2b, for a net impact of 23 to 33 feet of wetland impact. This is in comparison to 50 feet of impact for the original Alternative 2b with dry retention.

Construction of this alternative would require traffic lanes to be shifted to the north and a temporary wall system installed adjacent to the southern side of the roadway. The remaining embankment on the south side would then be removed and the new embankment installed up to the elevation of the existing road. The temporary wall system would be extended upward to permit the completion of a portion of the new roadway. Traffic would be shifted to the new roadway and the northern portion of the roadway excavated and reconstructed up to finish profile. The new roadway section would then be completed and traffic shifted to the final configuration. This process would be generally similar to the construction method for Options 1-A and 1-B. There is a cost premium associated with this scheme because of the roadway elevation differentials and the need for a temporary wall.

The estimated cost for this alternative is \$76,116,250 for the length of the corridor. This is a \$17,565,592 additive to the cost of Alternative 2b.

**Option 3: Exfiltration Trenches with Shoulder Gutter.** An exfiltration trench would be constructed below the roadway, with runoff routed from a shoulder gutter section with inlets spaced every 200 feet (Figure 24). The exfiltration trench would be comprised of an 18-inch perforated pipe surrounded by coarse aggregate and extending for the length of the corridor, less the bridge sections, on both sides of the roadway.

The collected runoff would infiltrate from the pipe into surrounding aggregate and dissipate into adjacent fill material. A filter fabric envelope would prevent introduction of sand into the rock trench. The invert of the exfiltration trench pipe would have to be above the design high water elevation of the L-29 Canal, or elevation 9.3 feet. The roadway profile would be at a centerline elevation of 16.0 feet, roughly two feet higher than for Alternative 2b.

The additional profile elevation affects the section width, but requires 17 to 27 feet less width (without and with stabilized side slopes respectively) than Alternative 2b, for a net impact of 23 to 33 feet of wetland impact, compared to 50 feet of impact for the original Alternative 2b.

Construction of this alternative would require traffic lanes to be shifted to the north and a temporary wall system installed adjacent to the south side of the roadway. The remaining embankment on the south side would then be removed and the new embankment installed up to the elevation of the existing road. The temporary wall system would be extended upward to permit completion of a portion of the new roadway. Traffic would be shifted to the new roadway and the northern portion of the roadway excavated and reconstructed to finish profile. The new roadway section would then be completed and traffic shifted to the final configuration. This process would be generally similar to the construction method for Options 1-A and 1-B. There is a cost premium associated with this scheme because of the roadway elevation differentials and the need for the temporary wall.

The estimated cost for this alternative is \$76,394,750 for the length of the corridor. This is a \$17,844,092 additive to the cost of Alternative 2b.

**Option 4: Wet Detention System.** A wet detention system would require treatment of one inch of runoff from the contributing area in contrast to a dry retention system, where the treatment volume is equal to one-half inch of runoff. It also would require a wider footprint than the dry retention design because the control elevation would be that of the L-29 Canal rather than one foot above the control elevation. A minimum depth of two feet below the control elevation would provide for deposition of sediments. Wet detention systems typically require a minimum width of 100 feet at the control elevation and an average depth between six and eight feet, which would require a wider footprint. Incorporating a wet detention system would require a variance from the standard typically required for this type of treatment.

As depicted in the schematic in a narrow footprint, this option would require a distance of 55 feet beyond the edge of the shoulder (Figure 25). The dry retention system as originally requires 35 feet. Even if stabilized slopes were employed, the wet retention option would have slightly more impact than the dry retention technique. Alternative 2b has a 50-foot wetland impact with natural slope grading; the wet detention technique with similar slope treatment would add 40 feet of impact, for a total impact of 90 feet.

The estimated cost for this alternative is essentially unchanged from the cost of Alternative 2b, \$58,550,658. The fill areas associated with each are nearly the same.

**Option 5: Single Dry Retention Area System.** In this option, there would be a dry retention area on only one side of the roadway (Figure 26). This single area would retain the standard 5-foot width. Drainage from the side of the roadway without treatment would be channeled via a shoulder gutter and gutter inlets and piped under the roadway to the dry retention area.

The roadway would require raising approximately 2.5 feet to accommodate an inlet and a connecting pipe. While this would eliminate a retention area on the north side of the roadway, the retention area on the south side of the road would be approximately 0.5 feet deeper and the sideslopes of the roadway wider due to the additional 2.5 feet of elevation. The net effect is that this footprint is 122 feet wide, while that for Alternative 2b is 112 feet wide, for an increased width of 10 feet.

If the dry retention area were constructed on the northern side of the road, the result would be similar. The new alignment must be offset from the canal by a minimum

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amount to accommodate maintenance of traffic requirements, and if the typical section is compressed sufficiently, then this maintenance of traffic criterion governs.

The construction cost for this option would be slightly greater than Alternative 2b because of the stormwater piping and gutter system. The estimated cost for this alternative is \$67,015,550 for the length of the corridor. This is an \$8,464,892 additive to the cost of Alternative 2b.

**Option 6: Grassed Strip (Minimal Water Quality Treatment).** An approximately 5-foot-wide grassed strip would be installed outside the guardrail to the edge of a reinforced slope. This would provide minimal treatment of surface water runoff by allowing the runoff to sheet flow through this 5-foot wide grass strip for filtration. This concept was used in Tampa at the Howard Franklin Bridge and approved by SWFWMD in lieu of a normal dry retention system. It could be adapted to Alternative 2a with some additional cost for additional fill area and costs associated with a slight shift in the alignment. Alternative 2a would have a wetland encroachment of 11.0 to 15.0 feet, depending on stabilized slopes used. The wetland encroachment could be avoided by encroaching into the L-29 Canal and building a short retaining wall or by building a retaining wall along the south right-of-way line. These options were not priced out, however, they would be significantly more expensive due to the wall section the entire length of the corridor.

Under Alternative 2b, the dry retention swales would be removed and replaced by the grassed areas and stabilized side slopes on both sides of the roadway, and the roadway built to the finish profile elevation of 14.0 feet. This footprint would be somewhat wider than for Alternative 2a and would likewise have wetland encroachment if the bank of the L-29 Canal was held as the north limit. Alternatively, if the south existing roadway slope limit was kept so that wetlands were unaffected, then a wall in the L-29 Canal would be required.

Construction of this option would require that the traffic lanes be shifted to the north and a temporary wall system be installed adjacent to this roadway on the south side. Then the remaining existing embankment on the south side would be removed and the new embankment installed up to the elevation of the existing road. The temporary wall system would be extended upward to permit the completion of a portion of the new roadway. Traffic would be shifted to the new roadway and the north portion of the roadway excavated and reconstructed up to finish profile. The new roadway section would then be completed and traffic shifted to the final configuration. This process would be generally similar to the construction method for options 1-A and 1-B. As stated earlier, there is a cost premium associated with this scheme because of the roadway elevation differentials and the need for the temporary wall.

Features of the various water quality options are summarized in Table 11.